FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 67 Thursday, April 30, 1942 No. 1341

Concentration Reaches the Ironfoundries

Last week-end ironfoundry owners in a large area received notices from the Board of Trade that they were to become either a nuclear concern or be closed down. The system followed is one involving quite local geographical grouping and a short period is given for the grouped foundries to effect amongst themselves an agreement for the carrying out of the concentration, one clause of which must be that the closed-down foundry is kept in a good state of repair by the nuclear foundries. Moreover, all the agreements made have to be filed with the Board of Trade. This then is the bare outline of the procedure. In spite of our warnings, which were especially stressed at the time of clothes rationing, the edict came as a shock to most. Obviously the foundries to be closed down feel the greatest grievance, but the nuclear ones also have their worries, as on them is placed the onus of increasing production, whilst quite probably undertaking new lines of business. The question is being asked as to whether the steps taken were necessary, and in the national interest. Here are some of the implications:—(1) The new scheme will reduce the burden on the transport industry; (2) it will economise fuel as the brickwork of only one cupola will have to be heated up instead of two or more; (3) skilled labour will be employed more efficiently, as in small or slack shops there is a tendency for them to do labourer's work; (4) a wider range of technical knowledge and skilled workmanship will be collected in one establishment. Out of this scheme can arise as much good as harm, providing the various groups make up their minds right now to co-operate wholeheartedly. One immediate beneficial reaction is that there has been a great increase in the members of the local employers' federation in the district initially affected, as this is the obvious channel through which proper and equitable arrangements can be made. As no doubt the grouping will extend to other areas, we again ask every jobbing foundry owner throughout the land to join a local association in his own, the industry's, and the national interest. If he be in doubt as to which one he should approach, a letter addressed to us will quickly bring this information. The wisdom of basing grouping on a localised geographical basis has been criticised, some asserting that greater efficiency would have been achieved by spreading the net wider and by telescoping foundries engaged on similar lines of work. This state of affairs will follow naturally, as economic convenience operates just with the same force now as always. It is an interesting commentary on present conditions that contemporaneously with the telescoping of the Journal, the industry it serves should receive like treatment. Our problems are analogous, that is to give the increased output and service from reduced floor space!

"IN SMALLER MOULD"

With last week's issue, THE FOUNDRY TRADE JOURNAL assumed its smaller size dictated by the essential need for saving paper, and, as already announced in the Editorial of the above title in our issue of April 2. It will be observed by readers that, apart from the enforced physical contraction in the two principal dimensions of width and length of page, the smaller FOUNDRY TRADE JOURNAL presents much the same appearance as its more robust predecessor. Its familiar style and layout have been carefully preserved, a policy which has already been endorsed by some of our readers. To one point special attention should be called: The issue of April 16 last terminated volume 66 of the JOURNAL, and an index to this volume is in active preparation. With the new size, volume 67 was started. This arrangement will, we believe, solve the difficult binding problem consequent on a change in size in mid-volume.

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MASTER PATTERNS OF PLASTER

BY "CHECKER."

The master patterns for metal coreboxes can often be made more satisfactorily in plaster than in wood, especially where the joint and shape of the corebox are such that it would be difficult to keep the wood from warping and twisting. Fig. 1 shows a core that was required in large quantities, and it was decided to make a metal corebox using a master pattern of plaster.

A wooden model was made from the drawing reproducing the core required, plus the extra contraction allowance, and a machining allowance for the three outlet faces of the corebox; then a frame was made to the outside shape of the corebox, with a block fitted into the bottom, the top of which formed the joint of

FIG.1.

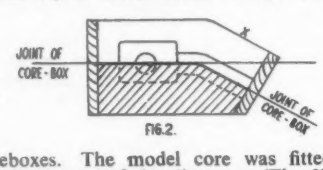

FIG.2.

the two half-coreboxes. The model core was fitted into this block to the centre of the diameters (Fig. 2), and on the slope X a piece of wood was fastened to keep the plaster from running out.

When this half was set, the frame was turned over and then taken to pieces, the inside block and model core removed; the plaster joint was varnished and well oiled; the model core and the frame put back; the plaster poured in, and, when set, the frame removed and the two halves taken apart. Lightening at the back of the corebox was done in a wood milling machine, with cutters which are used only on plaster work. It should be noted that all parts that came into contact with the plaster were varnished, sandpapered smooth, and immediately before pouring in the plaster well oiled.

LOW-CHROMIUM CAST IRON

Low-chromium cast iron containing suitable additions of such elements as silicon, copper and molybdenum has been used in many new applications in order to save nickel, states W. D. WILKINSON in "Blast Furnace and Steel Plant." Performance records of irons containing approximately 2.7 per cent. of carbon and 27 per cent. of chromium are outstanding for applications in which resistance to abrasion is the principal requirement. In sand mixers and sandblast equipment, as respective examples, plough points and liners made of this alloy were still in active service after ten years of use—outlasting tool steels by a ratio exceeding 20 to 1, and giving better service than would be expected of high-manganese steels—although they do not compete with the latter when good resistance to impact is essential. The high-carbon, high-chromium irons of the composition given are particularly easy to cast.

IRON AND STEEL INSTITUTE

Annual Meeting

The annual meeting of the Iron and Steel Institute will take place at the offices of the Institute, 4, Grosvenor Gardens, London, S.W., on Thursday, May 7, 1942, at 2.45 p.m., when Mr. John Craig, C.B.E., will preside at the outset, and will announce the award of the Bessemer Gold Medal for 1942 to Mr. E. G. Grace, Eng.D. (Bethlehem Steel Corporation, U.S.A.). He will then induct the President-elect, Mr. James Henderson (The United Steel Companies, Limited), to the chair, which will be followed by the presidential address.

Reports and Papers to be submitted and discussed include: (1) "Third Report of the Liquid Steel Temperature Sub-Committee" (Paper No. 9/1942 of the Committee on the Heterogeneity of Steel Ingots (submitted by the Liquid Steel Temperature Sub-Committee)). (2) "The Temperature Distribution in the Liquid Steel in Various Steelmaking Furnaces," by D. A. Oliver and T. Land (Paper No. 10/1942 of the Committee on the Heterogeneity of Steel Ingots (submitted by the Liquid Steel Temperature Sub-Committee)). The foregoing will be discussed together. (3) "The Work-Hardening and Ageing of Steel," by Prof. J. H. Andrew and H. Lee. (4) "First Report of the Standard Methods of Analysis Sub-Committee" (Paper No. 11/1942 of the Committee on the Heterogeneity of Steel Ingots (submitted by the Standard Methods of Analysis Sub-Committee)).

Presentation only of the following Report: (5) "Second Report on Refractory Materials," a Report by the Joint Refractories Research Committee of the Iron and Steel Industrial Research Council and the British Refractories Research Association (The Iron and Steel Institute, 1942, Special Report No. 28). This Report will be discussed at Sheffield on May 19, 1942, when a joint meeting, organised by the Institute in conjunction with the Sheffield Society of Engineers and Metallurgists, the Sheffield Metallurgical Association and the Refractories Association of Great Britain, will be held at the Royal Victoria Station Hotel, Sheffield, at 5.30 p.m., under the chairmanship of Dr. W. H. Hatfield, F.R.S. (Vice-President of the Institute; President of the Sheffield Society of Engineers and Metallurgists). The subject of "Open-Hearth Furnace Refractories" will be discussed on the basis of recent Papers published by the Institute.

Structure of Cast Alloys.—At the annual meeting of the American Institute of Mining and Metallurgical Engineers, J. T. Eash and N. B. Pilling presented structural diagrams for cast nickel steels and cast irons at 0.25, 1.5 and 2 per cent. silicon levels and containing up to 4 per cent. carbon and 30 per cent. nickel. They pointed out that, as a group, the alloys of iron, nickel and carbon are, in application, one of the most versatile of the ferrous-alloy family, and that while much had been done on properties and structure, little had been done on the microstructural relation over a wide range of composition.

CONTROL IN THE REPETITION FOUNDRY

AN ANALYSIS OF MODERN PRACTICE

By A. B. Bill

The introduction of repetition machining methods, for the development of which the automobile and allied industries have been largely responsible, has made demands on the foundries for large-scale production of castings, supplied in regular and reliable quantities, to ensure the continuity of production so essential to such industries. Exacting specifications for material, both chemical and physical, machinability, soundness and dimensional and profile accuracy are enforced, and it is incumbent upon those foundries to which the work is entrusted to fulfil such requirements and to ensure that rejections shall be as low as possible, so as to cause the minimum interruption of the flow through machining lines.

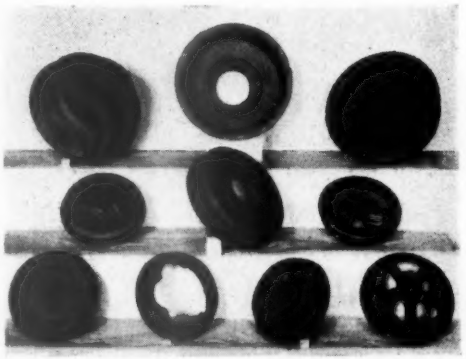

FIG. 1.—HUBS AND BRAKE DRUMS FOR AUTOMOBILE ENGINEERS.

There is, of course, a divergence of opinion as to what constitutes a "repetition foundry"—indeed, often amongst older foundrymen, no such place is admitted to exist. The author, however, is not alone in the opinion that where plant and tackle can be laid out to the best advantage to produce a succession of small or medium weight castings, with the minimum exercise of the moulders' and coremakers' skill and the maximum exercise of the art of planning and co-ordination of effort, such an organisation may well be termed a "repetition foundry."

Differences between Foundries

The jobbing foundry produces a variety of castings, usually with small quantities off, and with the least expensive pattern equipment; often quite different from any job made previously, so that only the general experience of its executives can be of assistance in determining the method of procedure. This type of work calls for the highest commendation and demands the greatest skill on the part of the moulders and coremakers and all concerned with their production. Semi-repetition of larger jobs is carried out, however, and has been ably

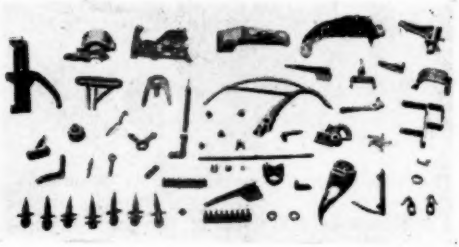

FIG. 2.—CASTINGS FOR AGRICULTURAL ENGINEERS.

demonstrated by Whitehouse, where special box parts, cut down to pattern joints, were illustrated together with turnover boards, etc., which, it is claimed, have resulted in large savings in ramming times. Even here, however, it is stressed that the individual skill of the moulder is of the highest importance, and that even the sand mixture used is in his hands, each man mixing a sand to suit his own ramming inclinations and the particular job.

In the repetition foundry, however, it is the fact that semi-skilled labour is largely employed (particularly since the advent of the war), which demands that each piece of tackle provided, each material used, and each operation carried out, shall be rigidly controlled at as many points as possible.

The foundry with which the author is associated produces many thousands of castings per week in "blackheart" malleable iron from hundreds of

* A Paper presented to the Lancashire Branch of the Institute of British Foundrymen, Mr. W. Holland presiding.

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different patterns, by a variety of methods, ranging from "spray" and "oddside" to jolt squeeze roll-over machines. Examples of these are shown in Figs. 1 to 3. The following remarks, therefore, will of necessity be influenced by this association, but at the same time will apply to repetition work generally.

With this class of work, the job to be set out for production has to be studied carefully and the method of production decided upon, which may depend on the size or probable extent of the order,

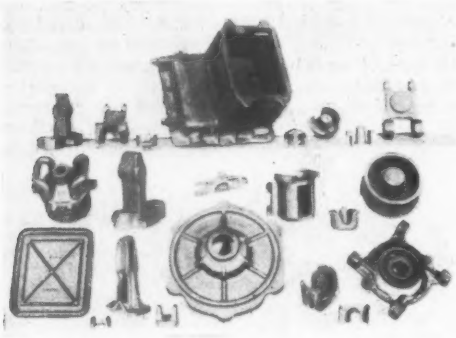

FIG. 3.—CASTINGS FOR ELECTRICAL ENGINEERS.

the intricacy or otherwise of the job, or perhaps the particular type of moulding machine available. Again, the decision as to whether the job is planned completely upon receipt of an inquiry may depend on the probability of an order to follow, and to some extent upon the scope of the planning department. If it is possible to do so, then a complete planning of the job while still in the inquiry stage is preferable for at least two reasons. First, because the job will be ready to go into immediate production upon receipt of the order and avoid delay, and, secondly, since careful study of the job may suggest slight alterations in design, either to facilitate moulding or to economise on cost of production.

Liquid Shrinkage

With steel castings, or malleable castings, the method of running and feeding in relation to disposition of mass and relative sections must be decided upon. Methods of trial and error are too costly for modern production, and whilst minor adjustments may be necessary after the initial lay-out, it is only rarely that trouble due to shrinkage should appear when once a job reaches the production stage. In order to overcome liquid shrinkage due to high initial freezing points and a short freezing range, top and side feeders may be used to provide reservoirs from which the casting can draw its supply of molten metal; these are quite a straightforward and obvious solution. Examples of these are shown in Figs. 4 and 5.

The position of such feeders for a given casting is often too obvious to need comment, and whether a top or side feeder is used is sometimes determined by the amount of room in the flask. While a top feeder may mean a small flask and less

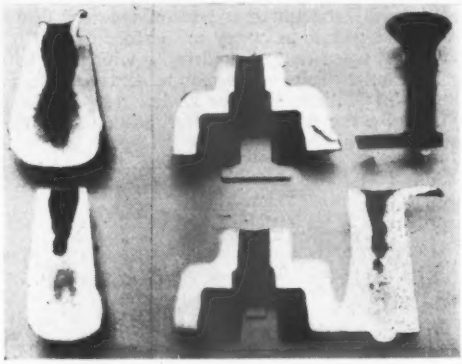

FIG. 4.—SHOWING EFFECT (ABOVE) OF SHRINKAGE DUE TO SEPARATE RUNNER AND FEEDER, AND (BELOW) SOUND CASTING WHEN RUN INTO FEEDER.

floor space, difficulties will arise if the feeders are not filled sufficiently. Shrinkage difficulties caused by inequalities in adjacent sections of metal generally give far more trouble, and it is here that co-operation between customer and foundry may mean prevention or at least improvement.

Redesigning Castings

Indeed the vagaries of the designer are responsible for many of the awkward problems which beset the foundry, and many castings could be made sounder, simpler and more economical to produce by slight alterations in design which would not impair their efficiency. When, however, the only solution to a difficulty is cure and not prevention, the expedients adopted may be many and varied, *e.g.*, ribs, or whole sections may need thickening up to keep them fluid long enough to allow feeding metal to find its way through to a

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heavy boss; an illustration of this is shown in Fig. 6. A pad may be necessary for the same purpose and subsequently removed. Bosses might have been cored out to reduce their mass, and the necessity for feeding may need heavy densening with the attendant dangers of blow holes and cold "shuts."

Hot Tears

Pulling or "hot tearing," a defect which although not wholly peculiar to malleable is probably encountered more in the founding of this material than any other, calls for special consideration.

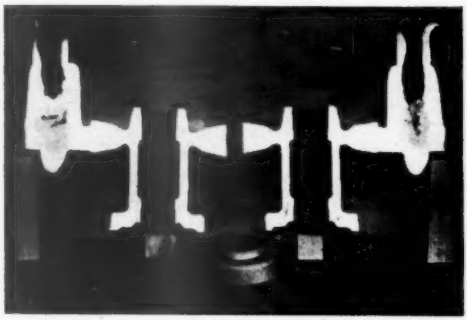

FIG. 5.—LEFT: SOUND CASTING WHEN BOTTOM PORTION IS CHILLED TO EQUALISE COOLING RATES AND PROVIDE PROGRESSIVE AND DIRECTIONAL SOLIDIFICATION. RIGHT: SHRINKAGE DUE TO DIFFERENT COOLING RATES AND INABILITY OF FEEDING HEAD TO GET THROUGH THIN CENTRE SECTION DUE TO RAPID FREEZING.

While tearing in a radius may often be overcome by increasing the fillet (or radius), a "tie" or thin bracket of metal is probably the only method of dealing with hot tears round the periphery of a casting. The elimination of internal tears, which may be caused by hard rammed cores, may necessitate considerable reduction in the bulk of cores, and in extreme cases a complete split through the core with its accompanying difficulties of registering and location.

Any resistance to contraction from solid shrinkage must be minimised to prevent cracking or distortion. It may be necessary to knock off certain feeders hot or to provide a period of slow cooling, by placing the castings in a muffle as soon

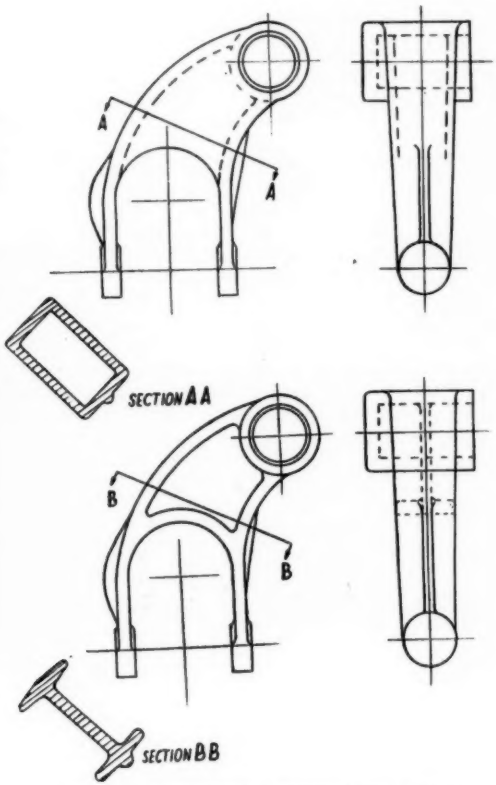

FIG. 6.—ALTERNATIVE DESIGNS FOR LAMP BRACKET CASTINGS.

as possible after casting. It is now general practice for most of the large consumers of castings to submit machining location drawings with their initial inquiries. This permits the foundry to consider the suggested points of location, intelligent criticism is welcomed, and if the layout does not meet with the requirements of the foundry, helpful co-operation is usually forthcoming to solve any difficulties to mutual satisfaction.

In order to ensure that location points decided upon are kept constant and clear, they should, wherever possible, be moulded, preferably in the bottom of the mould. The position of a core, or core assembly, is not so positive as the mould itself, and trouble may be experienced due to misplacement of cores forming part of locations.

D

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All these points need careful thought and must be considered when the job is planned initially.

Runners and Feeders included in Pattern Equipment

Finally, when the method of production has been decided upon it should be adhered to, and such denseners, feeders and ties as may be necessary should become an integral part of the pattern equipment, as is shown in Figs. 7 and 8, and not left to the discretion of the moulder.

Efficient pattern equipment is, of course, essential for easy and rapid production and close co-operation between foundry and patternshop

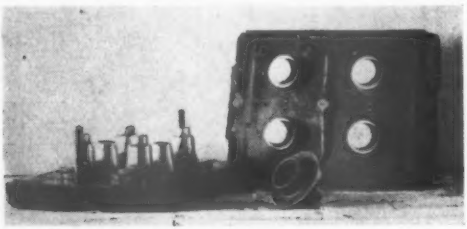

FIG. 7.—SHOWING WELL-BUILT PATTERN EQUIPMENT, METAL PATTERNS MOUNTED ON PLATE AND BOARD FROM JOLT SQUEEZE. RUNNERS AND FEEDERS INTEGRAL.

can do much to avoid "wasters" or loss of time during production. The patternshop has the job of making the tackle and of necessity has an eye to its cost, just as the foundry manager must look to his moulding costs. To temper this desire for cheapening equipment, however, it should be remembered that it is in the foundry that it is put to the test and that the cheapest and simplest equipment does not necessarily mean the most efficient moulding.

Pattern plates, for example, must be strong enough to withstand the rough usage inevitable in the foundry. Prints and registers should be adequate and well matched and enough general taper and root fillets should be allowed on the pattern to ensure an easy draw. Much valuable moulding time can be lost patching dragged moulds, apart from the danger of loose sand inclusions, and in many cases it pays to scrap a damaged mould.

Mould Patching

This is particularly noticeable with the use of synthetic sand mixtures which do not lend themselves readily to patching. From the danger of

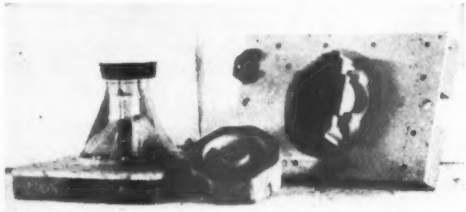

FIG. 8.—SHOWING PATTERN EQUIPMENT TOGETHER WITH BOX FOR CENTRING CORE FOR VERTICALLY LOCATED BARREL CORE.

washing, due to soft ramming or blow-holes or scabs from hard ramming, it is often more economical to ram a separate core up in the mould to replace a deep cod or pocket, despite the added cost of the corebox and coremaking time and materials. Many loose pieces, too, are better replaced by cores, although the loose pieces

FIG. 9.—SHOWING CORES ASSEMBLED BEFORE LOCATING IN MOULD WITH SIMPLE GAUGE TO CHECK FOR CONCENTRICITY, ALSO METAL SHELL DRYER FOR BARREL CORE.

may at first appear to be the obvious method of moulding. Locating cores (Fig. 9) are a more certain check for registering than soft sand prints where they can be used, and also facilitate moulding. Especially is this the case with bottom printed cores forming machined bores.

Once the job gets into production other problems are always the constant companion of the foundryman and some reference will be made to

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them, although it is not proposed to attempt to go into any great detail. In so far as actual moulding practice is concerned, for example, it would be superfluous to comment on the variety of defects which can arise from an even greater variety of causes, but particular mention can be made of the necessity for controlled ramming. From the study of many carefully prepared analyses of foundry scrap it can be safely said that improper ramming has been the cause of as many rejects as any other single factor. Particularly with the use of naturally-bonded sand, hard ramming, sometimes of only a portion of the

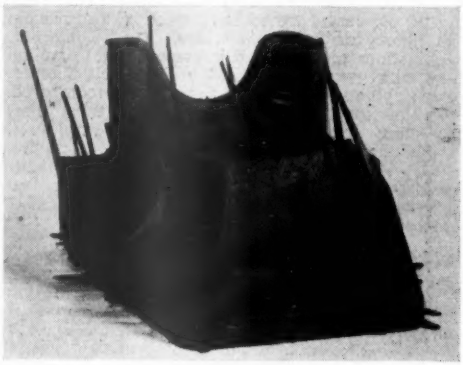

FIG. 10.—SHOWING EFFECTS OF INEFFICIENT MANUAL VENTING.

mould, with its consequent impermeability and inevitable blowholes or scabs, is a prolific scrap maker.

The use of the ordinary vent wire is slow and has a devastating effect on patterns on production moulding, apart from the fact that it is difficult to judge exactly where to apply the wire. A jig to fit over the box and punch real vents, instead of useless "whistlers," is easier and quicker to apply than the manually operated vent wire (Fig. 10) and soon pays for itself in a reduction of waste, besides safeguarding the pattern.

Sand Control

Controlled ramming and proper venting should be corollaries to a carefully prepared moulding sand, delivered to the moulder with almost foolproof characteristics. It should be as permeable as is compatible with strength; refractory, and sufficiently elastic to cover unavoidable differences in ramming density and mould sections. Coal dust in facing sand should be constant for a given class of work and sufficient to prevent face impermeability and scabbing as well as to assist cleaning operations and any subsequent machining. Much has been written in the past on the subject of sand control and it is not proposed to enter into any detail here. It would appear that an artificially-bonded sand lends itself more readily to control than natural sands, and it is certain that in the foundry with which the author is associated, careful control of a synthetic mixture, kept within predetermined limits of moisture content, compression strength and permeability, has resulted in almost complete freedom from defects which can be directly attributed to the moulding sand. This sand contains less moisture than the natural sand, has good green bond strength and is 4 to 5 times more permeable.

(To be continued.)

DEPTH-HARDENING OF CAST IRON

The effect of chromium, nickel and molybdenum on the depth and the hardness of the external hardened layer of cast iron has been investigated by E. E. Farafonov, I. S. Dukhin and V. A. Kuzin, according to a Paper in "Liteinoe Delo" (Foundry Practice), summarised in "Chemical Abstracts." It was found that increasing the amount of Ni in cast iron which has a high total-C content reduces the depth of both the hardened layer and the transition layer. This reduction in depth is especially marked at a Ni content of 2 per cent. If the C content is reduced in proportion as the Ni content is increased, the depth of the hardened layer is gradually reduced. For the production of castings having an external hardened layer with both the true hardened zone and the transition zone of slight depth and with the middle grey zone of good mechanical properties, Ni should be used as an alloying constituent. When the amount of Cr in cast iron of high C content is increased, the depths of the hardened and the transition zones are increased. The addition of Cr increases the brittleness of the middle grey zone of the cast iron. In cast iron having a high C content, a Mo content of up to 0.14 per cent. decreases the depth of the hardened zone, and especially that of the transition zone. Further increase in the Mo content up to 0.38 per cent. does not produce any essential improvement. For a cast iron of low C content a Mo content of up to 0.21 per cent. is without any essential influence; only after the Mo content has reached 0.46 per cent. is there a slight increase in the depth of the hardened zone and an essential increase in that of the transition zone.

E

ABSENTEEISM IN MUNITION FACTORIES

By V. J. GOSDEN (Personnel Manager of a Midland Factory)

Absenteeism is one of the biggest problems of present-day production. In some industries it is as high as 20 per cent. or 25 per cent., and in all parts there is a wartime increase. In this Company's foundry the increase is from 3.1 per cent. in pre-war days to 7.2 per cent. to-day. Is this inevitable or is it possible to secure a reduction to more normal levels? The reasons for absence can be divided into:—(1) Certified illness; (2) casual illness, and (3) other reasons.

Certified Illness for which a medical certificate has been supplied; it also covers works accidents. Genuine illness may be considered unavoidable, yet if an increase has become apparent there must be some underlying reason. The writer has found evidence of a wartime increase in certified illness for men but not for women. This is due to a proportion of our younger men having been "called up" and their places filled by older men and by men of low medical grade. In the foundry, the absence for this reason, for men engaged since the outbreak of war, is 6.7 days per 100 man-days worked, as against 1.87 for the others. It has always been the firm's aim to provide good working conditions, paying particular attention to ventilation, heating, lighting, and canteen facilities.

There has been a general increase in industrial accidents, due to the intake of new workers and the demand for extra production. In addition to the statutory safety measures, it is insisted that all who meet with accidents, however insignificant, should report to the Works Surgery. The avoidance of sepsis in this way is an important factor in reducing lost time. Finally, an essential for maintaining employees' health, is careful control of hours worked, avoiding excessive overtime, and providing adequate rest periods in each shift, and at intervals throughout the year.

Casual Illness where medical certificates have not been furnished. Some of this is genuine, for it is often wise to take a day off and prevent a lengthy illness. Nevertheless much of this absence is not due to illness and belongs to "unofficial holiday." Casual illness among employees engaged since the war is more frequent than among the older workers. This may be because some are not used to industry, some are of poor physique; but there are indications that loyalty to the company is another factor.

Other Reasons—Those most frequently given are "unofficial holiday" and "illness at home." "Unofficial holiday" (including "overslept," "away for the week-end," "missed the bus"), which accounts for 10 per cent. of the foundry absence, is inexcusable, and it occurs especially among wartime employees. Out of every 15 absences for this reason, 14 are assignable to the new men. Amongst older workers a tradition of loyalty to the company does exist. This has not had time to develop amongst newer workers, and this may account for some of their failings. To reduce avoidable absence (and to attempt to discover the cause of all absence), the firm adopted, in June, 1941, a system of interviewing returned absentees. This gave opportunity to inquire into their reasons for absence and, where necessary, to give warning or advice. As a result of this and propaganda in the works, absence due to "other reasons" was reduced by 27.5 per cent. for foundry workers in the second half of the year.

Short-period Absence

About 20 per cent. of the total lost time during the last six months of 1941 was due to half or one-day absence. Short-period absence occurs least on Fridays (pay-day!) and is highest on Mondays and Saturdays. (Perhaps some enterprising management might try changing their pay-day). In the foundry (where the 5-day week previously operated) Saturday's figure is high—nearly half the week's total. The main reason given for short term absence is casual illness, accounting for 50 per cent. "Unofficial holiday" also reaches a high figure for foundry workers.

Investigations did not provide evidence that employment of older workers resulted in increased absence, but when age and short term absence were compared, however, an inverse relation was found, most short term absence occurring amongst younger employees. In a subsequent study of lateness the same condition obtained. Whatver the explanation of this, it points to the fact that future propaganda should be directed to the younger workers.

Further Considerations

Avoidable absence is a symptom; so are avoidable lateness and slackness at work. What is the cause of these hindrances to maximum production? It is the fact that output, and therefore regular attendance, is not of personal concern to such workers. Failure to achieve a reasonable output in pre-war days led to dismissal and unemployment. This sanction has gone; but cannot management "get over" to labour the importance and urgency of the requirements of supply departments? This should not be difficult where a motor-car factory is producing tanks or where bombers are being made instead of buses, but it presents a problem where (as in the writer's case) the product required for war purposes is substantially the same as that previously manufactured. How can this problem be tackled? Let relevant information be shared as far as security allows. Let management, foremen and workers get together until each imparts to the others something of the sense of urgency which possessed the nation after Dunkirk. Above all, let management see that no opportunity is given to the workers, for any reason, even to *think* that there is slackness or inefficiency in administration.

Stuckert's "Enamelling Practice."—A second edition of "Die Emailfabrikation," by DR. L. STUCKERT, which has been completely revised and enlarged, was published last year by Julius Springer, Berlin, price 26 Rmk. The general arrangement is unchanged.

RECENT DEVELOPMENTS IN SAND TESTING*

Comparative Survey of British and American Investigations

By Wm. Y. BUCHANAN

Introduction

The following is one of those controversial Papers which will please some, irritate others, but if it makes foundrymen in general think, the author feels that there is some justification for it. It is hoped that the irritation will pass, but that the good effects of the time spent on the lines of thought indicated here will remain to increase the knowledge and understanding of the subject within the industry to the ultimate benefit of all concerned.

I—ANALYSIS OF PRESENT POSITION

One statement made in a letter which formed the last of a long series of written arguments on sand testing between the author and a critical friend, was to the effect that discussion during the last two years had become extremely scarce, and this, the writer of the letter thought, indicated that the American system as advocated by the Institute had been found to be quite satisfactory to all concerned; in short, that foundrymen were able to use the American Foundrymen's Association method and found its results sufficiently reliable to give them the required degree of control in their foundry problems.

This temporary lull in discussion on sand-testing methods might have been more naturally explained on account of the activities in this direction being reduced during wartime, owing to the excessive pressure of ordinary production work. The study of sands and sand testing have therefore fared no worse than any other branch of foundry science during the present emergency.

The Test-Piece Controversy

The suggestion that the A.F.A. method is entirely satisfactory to foundrymen is not borne out by the recent tendency in America to follow up the lines of investigation into test methods suggested by the author and to carry out systematic experiments, rather than engage in mere arguments between individuals. In this connection, the recent articles by Ash and Lissell and by Ramsay in "The Foundry,"† and the special report, including work on the comparison of specimen sizes, by the American Foundrymen's Association, are particularly relevant.

In this country, the author has observed a tendency to suppress criticism of the American system in the Institute itself, presumably under the impression that this would cause offence or perhaps "retard progress," but this implication does the Americans an injustice, as the author is assured by American friends that they would not hesitate to improve their methods if any reasonable suggestion were put forward.

There can be no question of the vast amount of work done over the last 20 years or so by the A.F.A., and of the very high quality of American technical literature on all phases of foundry science, which has formed a basis for detailed study by foundrymen in all parts of the world. Their research organisation had been on a grand scale and well financed.

British Contributions

If, in fact, the Institute's contribution to the study of foundry-sand testing be examined, remarkably little will be found. Richardson's modification of the permeability apparatus was for some time favourably considered against the available B.C.I.R.A. apparatus using coal gas, it being claimed that some small foundries had no supply of gas, but the replacement of this coal-gas apparatus with a model similar to that of the A.F.A. more or less cancelled out Richardson's apparatus.

According to the last official committee recommendation, the A.F.A. sand-testing procedure was adopted more or less unaltered on the strength of a vote, and the decisions were more influenced by each member's personal opinion than on any serious attempt to reach a decision by research. Surely the Institute could have made a more monumental contribution to this particular branch of foundry science than that. The author has put forward a large number of constructive sugges-

* Paper read before the Scottish Branch of the Institute of British Foundrymen.

† For an annotated abstract of the Papers by Ash & Lissell, see F.T.J. for December 25, 1941.

tions, all of which have been worked out in great detail, and these cover the whole field of sand testing with the exception of sintering tests, sieve tests and durability tests.

Committee's Procrastinations

These contributions have been formally put before the Institute's Committee, and have on various occasions been put on the agenda, but have always been put back as being too advanced for the Committee's immediate consideration and have never been added to by others; they have for the most part been shelved for consideration by some later generation.

As an individual, the author considers it a serious reflection on the Committee's method of procedure that they require about six years to absorb a new idea; by the end of that time the personnel has changed, and the originator of the idea, and even the idea itself, have been forgotten. In America, most of the apparatus has been developed by one private firm, and this firm seems in most cases to have been well ahead of the corresponding committee.

It would appear, however, that much more progress would result from competition between two or more such private firms with the committee acting as adjudicator; there is more to be had from individuality than from excessive control by committees. The qualities of originality and inventiveness do not spring from the atmosphere of committees.

Modern Tendencies

Several distinct tendencies can be claimed to have followed the systematic use of sand testing (the greater value of the research as near foundry conditions as possible over the so-called routine tests being admitted) such as, for example: (1) The use of high-grade bond addition instead of the steady displacement of used floor sand by raw moulding sand; (2) the regulation of dry strength by cereal binders; (3) the elimination of such additions as chopped straw, sawdust, etc.; and (4) the sand mill for the preparation of facing sand is now as common as it was rare prior to the introduction of sand testing.

The success of the A.F.A. organisation has been attributed to the initiation, financing and provision of its own personnel for this particular work. Conditions in America are almost parallel to those here, and research on sand testing was originally carried out in universities. The would-be research worker in, or attached to, a foundry has always the great advantage of the criticism of other foundrymen and there is not usually any marked reluctance expressing this criticism. The university or completely-detached worker is in many ways at a disadvantage without this restraining force of adverse criticism, which reveals the weakness of his ideas at the earliest opportunity.

There is indeed evidence of serious investigation carried on by foundymen of more or less lengthy experience, with all the advantage which goes with the facility for full-scale trial, that must be admitted to be ordinary. It is the author's opinion that if more attention had been paid to existing "University dissertations" until the test procedure had been further advanced we would have been better off now. At the same time some of the material turned out by the opposite school has not "set the town on fire."

Wasted Opportunities

The Institute Sands Sub-Committee was formed in 1930, nine years after the A.F.A. organised research on sands started. The author's own active membership of the Institute Sands Committee dates from about 1932 and since that time the membership of the committee has almost completely changed. It should be noted that the B.C.I.R.A. work on sand was begun in 1924, *e.g.*, six years before that of the Institute Committee.

The principle theories underlying the original method of the B.C.I.R.A. were quite sound and the improvements suggested by the author centred on the inability of the average operator to reproduce the same degree of ramming in a result representing a small number of tests, *i.e.*, to get a reliable result it was found advisable to repeat the test a large number of times.

The tall type of test-piece was used in the research and control tests of the B.C.I.R.A. and thus it was established in this country before the Institute Committee began its work. The author, like many others, had in 1930 and 1931 used the tall type of test-piece extensively and had not yet heard of the A.F.A. test-piece and rammer.

When the A.F.A. test-piece and fixed energy ramming device were evolved, it was the duty of the then-committee to compare and weigh carefully the relative advantages and disadvantages of this substitute for a test method to which members were already accustomed. To those who joined the committee later and to others throughout the country with American connections and experience the position was reversed. The A.F.A. procedure was their accustomed standard which was merely being given official recognition of the Institute and so this apparently normal procedure

was from their point of view being held up by "unending discussions."

Present Organisation

That organised interest in sand testing has increased is made clear by the fact that in 1924 the B.C.I.R.A. was the only technical body in this country taking an interest in sand testing, while by 1941 the following additional bodies had also taken up the study:—The I.B.F. Sands Sub-Committee (general), the British Non-Ferrous Research Association (non-ferrous), the Iron and Steel Institute, and the Joint Committee (Test Methods and Standards).

No matter how many committees are formed, the all-important matter of test-piece technique remains as urgent as before. As to whether the set of individual Committees already mentioned are more effective than the same personnel would be under the direction of one committee, such as the Institute, is doubtful, and indeed they seem to some extent redundant when the industry is merely adopting the A.F.A. procedure. This suggests that some fusion of the committees would merely crystallise the existing state of affairs. There is already so much in common between the A.F.A. and the Institute, no doubt some foundrymen have membership in both, that a move towards co-operation, if not in actual membership, at least in committee activities dealing with subjects of common interest, as the testing of sands, would be to the ultimate benefit of the industry.

It may be mentioned that recently in America the author's suggested Index of Ramming methods have been vaguely referred to as the English system, as though they were accepted or commonly used, but this is, of course, wrong as the B.C.I.R.A. and the Institute now both use the A.F.A. officially.

II—DR. RIES' REPORT

In the 19th Annual Report of Dr. Ries, Chairman of the A.F.A. Sand Research Committee (May, 1941) it is pointed out that the committee did not really appreciate how important some of the sand properties were, nor how little they knew about them, and that other properties equally important were discovered as the work went on. The report points out that the original function of all tests was essentially foundry control.

This being so, it is not unreasonable to expect that after 19 years of progress and critical discussion, these essentially foundry methods should require some improvements in the light of present knowledge in order to make them suitable for conducting detailed work on what is really difficult research. Most progress in modern sand technique has come from knowledge of fundamental properties which are expressed in definite statements based on *research* irrespective of its quality. On the question of test procedure the Report says: "*The committee on sand research realises that some of the tests might be improved, and efforts to accomplish beneficial changes are now under way.*"

It is only fair to add that this statement goes on to say "there have been cases where some tests have been strongly condemned, but it has usually been found that in such instances the fault lay with the operator and not with the tests or apparatus." This can be readily understood, but the test-piece question does not come under this category. The fact that the committee is making efforts to accomplish beneficial changes is encouraging.

Cost of Apparatus

Dr. Ries remarks that some members of the industry feel that the apparatus now on the market in America is rather expensive, a statement which comes as a surprise to the author, who always thought the apparent disregard for cost was a big advantage to the designers of American sand-testing apparatus.

The B.C.I.R.A., on the other hand, has always been hampered by having to design apparatus to cost so little as seriously to affect the quality of the manufactured machines. A tendency by many, to make apparatus out of anything which comes handy, has now passed, but it had serious consequences on some of the early efforts of sand testing. The position in sieve testing seems to be very much the same as it was about 1933; however, if good quality B.S.I. standardised sieves are used and an invariable routine procedure used, the results can be quite useful.

Clay Determination

The A.F.A. method of clay determination according to the report has been claimed to be too long, and most people will agree with this, while a simpler elutriation test would certainly require less attention even if it did not take less over-all time. The B.C.I.R.A. method, first drawn up by Skerl, favoured the elutriator system, and for clay determination the wisdom of his choice now seems amply justified. For simplicity the elutriator of the Schultz type may readily be standardised and used following the usual shaking with sodium-hydroxide solution, in place of the long drawn-out washing and syphoning process.

Recent Developments in Sand Testing

One method mentioned in the report as worthy of consideration, has been developed by W. A. Rengering. To some extent, the apparatus used resembles the Schultz elutriator; it is shown in Fig. 1. The manner of adjusting the rate of flow of water to remove only the clay grade is, however, not specified, and this must be a controlling factor. The determination of clay is essentially a laboratory test, while it is far more important to determine the bond value or active clay. The author suggested a number of years ago

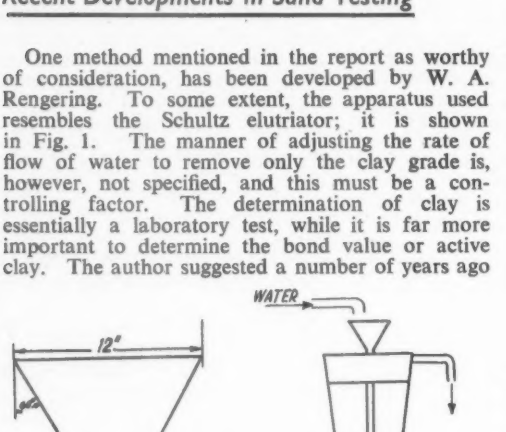

FIG. 1.—TYPES OF ELUTRIATORS SUITABLE FOR CLAY ESTIMATION IN MOULDING SANDS.

that this could be done by a simple loss on ignition tests.

When the combustible material is constant or absent, the active clay content is directly related to the moisture loss at red heat after first drying at 100 deg. C. It might be better to add here that this has only been tried by the author on one type of bond material, and it is probable that different bond materials will give off different quantities of combined water. In the presence of variable percentages of carbonaceous material, the moisture from the combined water in the active clay could be selectively absorbed, for example, by a lithium chloride solution.

Grain Distribution

In the case of grain distribution, attempts have been made to develop various forms of graphical representation, but these do not seem to have met with much favour, although they are reproduced in quite a number of recent Papers on synthetic sands. There seems to be a certain fascination in arranging sieve fractions in test tubes or bottles set in a small wooden stand, as most people turn to this at one time or other during their study on sands; but un unlimited supply of these bottles cannot be kept and the method, although more striking at the time, gives no more information than the set of sieve fractions expressed as simple percentages in tabular form. The author has also tried shaking in a graduated glass cylinder with water, when grading takes place and can be estimated by the graduations on the glass.

Green Deformation

As regards green deformation, the author believes this property to be very important; it is difficult to see how anyone can think otherwise, unless the possible poor opinion of the test is the result of some futile attempts to make the measurement with apparatus which is not capable of measuring accurately. The green deformation measures the plasticity of sand or its "mouldability," if one may use another word in the American style.

Following the appearance of Dietert's efforts, the author first put this before the Institute's Sands Committee for the consideration of the members, who eventually found it necessary to give up the matter. The author then agreed to carry out development work, and the result was a simple, but accurately-constructed, machine which proved satisfactory. It was put before the committee for consideration, together with considerable test data showing direct application of the test to foundry conditions. The whole question, as far as the author knows, is still on the agenda.

The tensile test is not much used, and it seems to measure much the same property as the compression test, *i.e.*, the tenacity of the bond material at the surface of fracture. Some foundrymen still prefer the transverse test for oil-sand, but this again measures the same property, although there is a difference in the application or distribution of the stresses.

(To be continued.)

Powder Metallurgy.—A recent number of the Colorado School of Mines Quarterly contains the second edition of the literature review of powder metallurgy, prepared by Clark A. Carpenter. The first edition was issued early in 1941, the present one has been revised and brought up to date of July last. It contains over 100 references.

USE OF WASTE PRODUCTS

Progress of Salvage Campaigns

In a lecture on "Making Use of Waste Products," given before the Royal Society of Arts recently, MR. J. C. DAWES, O.B.E., M.I.Mech.E. (Controller of Salvage, Ministry of Supply, stated that salvage work was important at any time; in wartime it was of fundamental importance, especially to us as an island people. We must have greatly increased supplies of raw materials, many of which were normally imported, at a time when the difficulties of carrying sea-borne cargoes were truly great and hazardous. Referring to the results of Local Authorities' salvage schemes to date, he gave figures from which the following are selected, for the period November, 1939, up to February 28, 1942: Waste paper collected, 639,159 tons (£2,629,105); ferrous metals, 527,300 tons (£1,133,191); non-ferrous metals, 20,455 tons (£369,053); textiles, 35,319 tons (£249,705); fuel (cinder), 179,106 tons (£63,630); organic fertilisers, 56,577 tons (£48,133); bones and bone meal, 18,655 tons (£61,872); kitchen waste, 270,908 tons (£494,225); waste fish and fish meal, 10,322 tons (£23,381); fats, 2,790 tons (£33,024); total of direct salvage (including other items not mentioned), 2,264,714 tons (£5,418,105).

The last war taught us an unforgettable lesson about the value of waste paper during a world war; after re-pulping and re-manufacture it is transformed into containers and carriers of many vital munitions or accessories. It was obvious, therefore, that huge quantities would be needed as the war developed, and Local Authorities were asked in October, 1939, to organise systematic collections from houses. When the Scandinavian countries were overrun we lost valuable sources of wood pulp, and consequently immediately increased the demand for waste paper, 22 cwt. of which will produce approximately 1 ton of pulp. The tonnage of paper collected by the Authorities to date is no less than 639,159 tons, or 12,783,180 1-cwt. bales. Reckoned in terms of ships, 116 each of 5,000 tons capacity, would have been necessary to carry an equivalent tonnage of wood pulp to this country.

The following monthly salvage quotas have been fixed for each per 1,000 of population: 1 ton waste paper, ¼ ton metal, 1 cwt. household bones, 1 ton kitchen waste. For some time the metal quota was more regularly reached than the others and by a larger number of Local Authorities, but the number now reaching the paper quota is about the same. A majority of the public now realises that all scrap metal is wanted, but one must add that a substantial minority does not do so, with the unfortunate result that much ferrous scrap has not been recovered for salvage.

Ferrous Scrap

Indicating the part played in the ferrous scrap campaign by the Local Authorities, the speaker said it was one thing to handle heavy ferrous scrap such as old machinery, blitzed girders and stanchions, tram or other rails, and set them on their way to the blast furnaces, but it was quite another, patiently and regularly, to collect, house to house, bale into billets and deliver thousands of tons of old tins of all kinds. It takes (he said) some 15,000 to 20,000 tins to make a ton, but no less than 309,978 tons have been so dealt with to date by Local Authorities. In addition, they have collected and sold 217,322 tons of light scrap made up of bits and pieces (old pots and pans, broken garden rollers, galvanised buckets, tanks and other fragments), making a grand total of 527,300 tons. These are excellent figures, after taking into account the difficulties, such as labour shortage, transport problems and other obstacles.

Referring to non-ferrous scrap, the speaker gave the following quantities of non-ferrous metals which have been collected or recovered by Local Authorities chiefly by means of picking up small amounts in house-to-house collections: Aluminium, 886 tons; brass, 2,235 tons; copper, 2,382 tons; lead, 5,340 tons; making a total of 10,843 tons. Some 9,000 tons of other mixed non-ferrous metals have also been salved.

U.S. MANGANESE ORE IN 1941

Deliveries of manganese ore (35 per cent. or more manganese, natural) from United States domestic mines are estimated at 76,000 long tons in 1941 compared with 40,123 tons in 1940, according to the Bureau of Mines. Arkansas, Montana, and Tennessee accounted for about 77 per cent. of the total in 1941. Deliveries of ferruginous manganese ore (10 to 35 per cent. manganese, natural) from domestic mines are estimated at 459,000 long tons in 1941 compared with 320,006 tons in 1940. New Mexico and Minnesota contributed about 93 per cent. of the 1941 total. Deliveries of manganiferous iron ore (5 to 10 per cent. manganese, natural) from domestic mines are estimated at 820,000 long tons in 1941 against 816,541 tons in 1940.

General imports of manganese ore containing 35 per cent. or more manganese during nine months ending September 30, 1941, comprised 838,239 long tons of metallurgical ore containing 393,741 tons of manganese and 14,951 tons of battery-grade ore containing 7,869 tons of manganese. During the entire year 1940, general imports of both grades were 1,294,316 tons containing 615,943 tons of manganese. Of general imports, part goes into immediate consumption and the remainder into bonded warehouses. The principal supplier in the nine months was Brazil, with 235,103 long tons (Mn content, 101,996 tons), followed by British India, 177,729 (88,452) tons, Cuba with 164,819 (78,115) tons, and the Union of South Africa with 153,597 (72,506) tons.

Effect of Aluminium Coatings on Cast Iron.—According to R. ROLL, in "Korrosion und Metallschutz," a sprayed coating of aluminium on various specimens of cast iron with 2.9 to 3.4 per cent. C, 2.1 to 3.8 per cent. Si, 0.4 to 1.2 per cent. Mn, 0.11 to 0.70 per cent. P and 0.06 to 0.12 per cent. S, does not in any way affect the growth or scaling of the irons in air and nitrogen at a temperature of 850 deg.

INSTITUTE OF BRITISH FOUNDRYMEN

Notes from the Branches

Lincoln Section

With Mr. H. J. Read (Vice-President) in the chair, this Section held its annual general meeting on April 11. The secretary's report stated that, despite wartime difficulties, the Section had held its usual number of meetings, which had been fairly well attended. Financially, the Section occupied a very sound position. There had also been an increase in membership.

Mr. H. J. Read was unanimously elected President. He welcomed Mr. H. J. Beck and Mr. S. A. Horton, President and secretary respectively of East Midlands Branch. Lecturers were becoming scarcer and the added demands on the time of those lecturers available made a visit to Lincoln a very difficult proposition for them. Mr. J. H. Bingley and Mr. A. Weightman were then elected Senior and Junior Vice-Presidents respectively; the Council was re-elected *en bloc* with the addition of Mr. R. Horton and Mr. J. Sherar.

The chairman then opened the meeting for general discussion on foundry topics. Mr. R. Horton commenced with a short talk on non-ferrous melting conditions as related to tests conducted on the cast metal. Casting temperature is too frequently accepted as the deciding factor for obtaining satisfactory gunmetal castings and test bars. He had proved by experiment that without suitable melting technique, casting temperature became an invalid feature of foundry practice. In open-flame furnaces, particularly, Mr. F. Hudson had already stressed the deleterious effects of reducing furnace atmospheres, which encouraged hydrogen absorption. The obvious remedy was to employ a suitable flux to promote oxidising conditions in the melt itself, and/or, the maintenance of an oxidising atmosphere in the furnace. In the oil-fired rotary furnace the speaker had in mind, the presence of an oxidising medium in the metal had not proved sufficient to overcome the strongly reducing tendencies of the oily flame, commonly used as standard practice at the time, and it had been found essential to work with an oxidising flame. Under these conditions speed of melting became an important factor. Prolonged melting time gave high melting losses with a heavy skin on the molten metal, although test-bar results had been good. Finally, with the type of furnace in question, it had been decided that melting as quickly as possible under oxidising conditions gave satisfactory test bars and sound castings over a wider range of pouring temperatures than those usually specified.

Mr. Beck appreciated the foregoing remarks, as an instance of the necessity when tackling foundry problems, to ascertain the reason for a fault before attempting to arrive at a successful remedy. With a clear knowledge of the cause of any trouble, one was half-way to the solution of the difficulty.

Discussion then centred round attracting apprentices to the foundry and the necessary improvements in foundry working conditions; the provision of adequate washing facilities, better lighting and ventilation, and, above all, improvement in the general cleanliness of most foundries. When considering the latter, concrete floors are a big asset, but their dangerous reaction to contact with molten metal presents serious drawbacks to their use.

Improvement of foundry conditions was a step in the right direction, but criticism must be levelled at modern schedules of education, which lamentably failed to prepare present-day schoolboys for their introduction to industrial requirements. The foundry, as all other industries, needs apprentices that it may flourish; it is an industry employing skilled technicians and requiring craftsmen in all the true sense of the word. No doubt the lack of appreciation of this latter explains the aversion of modern youth to adopt founding as a career; certainly a little justifiable publicity of the true value of the art of founding would encourage apprentices to the industry.

PRODUCTION PANEL FORMED

To Assist the Supply Ministers

A Production Panel composed partly of leading industrialists and partly of labour experts has been set up by the Minister of War Production, the Minister of Labour, the First Lord of the Admiralty, the Minister of Supply, and the Minister of Aircraft Production. Mr. Robert Barlow, of the Metal Box Company, Limited, will be the chairman of the panel.

Mr. Oliver Lyttelton announced in the House of Commons last week that the panel would work as part of the division of his office to which, in his statement last month, he referred as the production division, but which he has now renamed the industrial division. The functions of the industrial division were to assist the Supply Ministers and himself on questions affecting production in the factories such as defects in the organisation or lay-out of the plants; difficulties arising from labour supply or the misuse or under-employment of labour and machine tools; financial or administrative obstacles, etc. As head of this division he had appointed Mr. Ivan Spens, who had been released from the Ministry of Supply for this duty. Mr. Spens and Mr. Barlow would act in closest association in the day-to-day work of this division.

The panel would not function as a committee, but appropriate members would be selected from it as necessary for the purpose of giving advice and assistance on particular problems, or for conducting any special investigation on the spot as might be necessary to get to the root of the trouble. Reports of such inquiries would be presented to the Minister of Production and other Ministers concerned direct, so that any necessary action could be initiated at a high level. It was not his intention that the industrial division or the panel should assume responsibilities properly belonging to the Supply Departments, but the panel was intended to assist them all. He would make the names of the panel known very shortly. It would be purely advisory in character.

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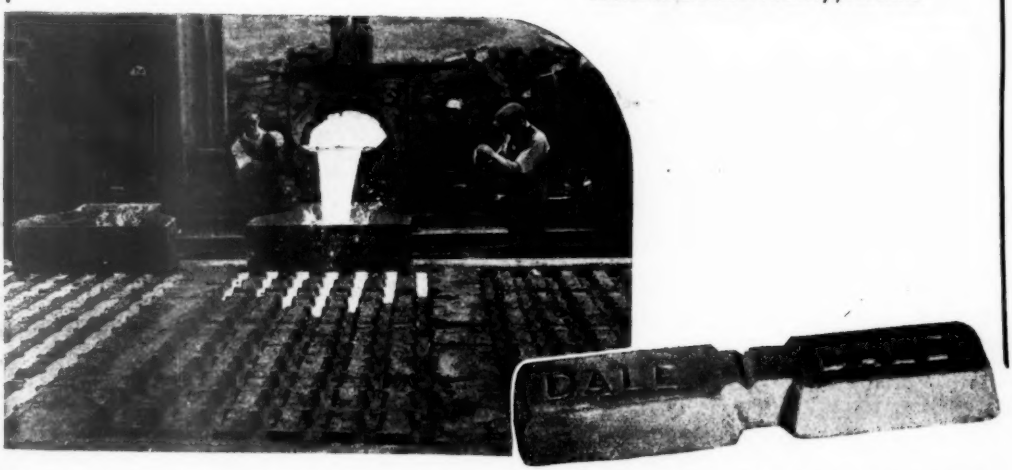


THE STANTON IRONWORKS COMPANY LIMITED, NEAR NOTTINGHAM

NEWS IN BRIEF

A NEW DRIVE for scrap metal is being launched in Scotland.

THE MASTER OF THE MINT has decided to reduce the proportion of tin in the alloy of the Imperial bronze coinage to one half of 1 per cent.

DURING THE PAST FOUR MONTHS the London Midland & Scottish Railway has sent to iron and steel works nearly 11,000 tons of scrap metal from damaged London buildings.

THE SALVAGE EFFORT of local authorities yielded up to the end of February 2,264,714 tons, which they sold for £5,682,466. Included were 527,300 tons of ferrous and 20,455 tons of non-ferrous metals.

SINCE CONCENTRATION OF INDUSTRY was introduced a year ago the plans have covered 50 industries. The total effect to date as regards labour is that 200,000 workers have been released for other employment.

THE MINISTRY OF SUPPLY has issued an urgent call for less wastage of oxygen, for more efficient use of equipment, and for a 25 per cent. quicker turn-round of cylinders, which are frequently "hoarded" by consumers.

AMERICAN CONSUMPTION of scrap iron and steel in February, 1942, was a monthly record of 4,276,000 gross tons, against 4,172,000 tons in February, 1941. For the first two months of 1942, 8,866,000 gross tons of scrap were used, against 8,450,000 in the parallel period of 1941.

MR. J. C. SUMPTION has resigned the secretaryship of the National Federation of Iron and Steel Merchants, Brettenham House, Lancaster Place, Strand, London, W.C.2. He will be succeeded by Mrs. T. F. Mount as acting secretary. Sir William Jenkins will continue to be the independent chairman of the Federation.

IT IS CLAIMED for a steelfoundry in the south-east of Scotland which Mr. Thomas Johnston, M.P., Secretary of State for Scotland, visited on April 24, that it has the distinction of employing a larger percentage of female labour than any similar works in Britain. It has 160 women on the pay-roll. The majority came from shops and offices.

THE CONSTRUCTIONAL ENGINEERING COMPANY, LIMITED, Birmingham, have opened a canteen for the use of their employees. Mr. T. Makemson, Joint Director of Iron Castings, performed the opening ceremony over which Mr. D. H. Wood, chairman and managing director of the company, presided. Illuminated testimonials were presented to those who had been in the employ of the firm for longer than 20 years.

THE NON-FERROUS METALS CONTROL is rationing the quantities of zinc and copper allotted to process engraving firms. For the three months which began on April 1 only 15 per cent. of the amount of zinc purchased by firms during 1940 will be available, while the issue of copper for May, June, and July will be only 12½ per cent. The importance of sending for salvage old blocks and stereos is emphasised by the Control.

PERSONAL

MR. G. L. HARBACH, the newly elected president of the East Midlands Branch of the Institute of British Foundrymen, has recently been re-elected president of the Newark Engineering Society.

MR. J. D. CARMICHAEL, of South Shields, president of the National Ironfounding Employers' Federation, has recently been elected chairman of the North of England Ironfounders' Association. Mr. Carmichael is also a vice-president of the Council of Ironfoundry Associations and a member of the Executive Committee of that body.

Wills

GARDNER, W. J., chairman of the Meltham Silica Fire Brick Company, Limited, Huddersfield ... £734

PHILLIPS, F. H., of Four Oaks, steel manufacturer, managing director of James Fairley & Sons, Limited £61,305

CHAPMAN, J. H., of Sheffield, late of Ibbotson Bros. & Company, Limited, steel and tool manufacturers £18,632

FOXALL, G., of Blackpool, formerly chairman of Hartcliffe, Lee & Malkin, Limited, steel chain manufacturers, Salford £42,667

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"NORSTEL"—Hand tools, rails, pipes, tubes, sheets, bars, rods, etc. NORTHERN STEEL SCAFFOLDS, LIMITED, 29, Park Avenue, Southport.

"NORISTALTIC"—Power-driven stationary pumps, and compressors. NORDAC, LIMITED, Dukes Road, Western Avenue, London, W.3.

"UNILITE"—Grinding wheels, and also electric resistances. UNIVERSAL GRINDING WHEEL COMPANY, LIMITED, Doxey Road, Stafford.

"SPHERE"—Reamers, shaping, drilling and sawing machines, etc. B. ELLIOTT & COMPANY, LIMITED, Victoria Road, Willesden, London, N.W.10.

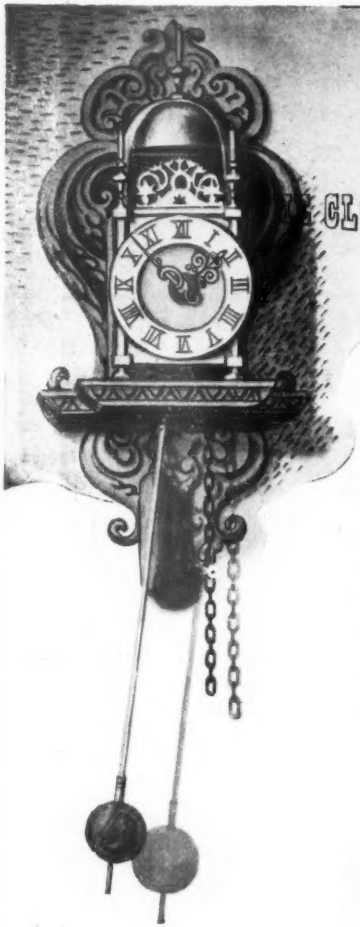
"ELKONITE"—Electrodes for electric welding. P. R. MALLORY & COMPANY, INC., c/o Stevens, Langner, Parry & Rollinson, 5 to 9, Quality Court, Chancery Lane, London, W.C.2.

STEEL CONTROL ORDER INFRINGED

Fines totalling £800, with 20 guineas costs and advocates' fees, were imposed at Derby, recently, on Ford & Weston, Limited, a firm of contractors, for infringement of the Control of Iron and Steel Order.

Mr. H. Stephenson, prosecuting for the Ministry of Supply, said there was a series of summonses against the firm for acquiring steel sheets and netting without a licence from the Ministry, and for paying more than the maximum price for the material. They purchased sheets at an average excess price of £2 per ton, and netting at 35s. a roll, he alleged, when the controlled price was 16s. 6d.

The firm had made themselves liable to maximum penalties of £14,463.



CLOCK TICKS *ON*

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WORKINGTON IRON & STEEL COMPANY

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Branch of The United Steel Companies Limited

W. 61

COMPANY NEWS

(Figures for previous year in brackets.)

Craven Bros. (Manchester)—Net profit, £60,161 (£73,012).

Switchgear & Cowans—Profit for 1941, £27,688; dividend of 10% (15%); forward, £8,281 (£6,480).

Projectile & Engineering—Final dividend of 7½% (same) and a bonus of 5% (same), making 20% (same).

John Summers & Sons—Dividends on the "A" stock of 6% (same) and on the "B" stock of 2% (same) for 1941.

British Lead Mills—Profit to October 31 last, £8,372 (£12,598); tax, £6,739 (9,075); no ordinary dividend (10%); forward, £5,453 (£3,820).

James H. Lamont—Net profit for 1941, £46,185 (£33,239); final dividend of 15% (20%), making 22½% (25%), with participating dividend on preference shares of 2% (same).

John Shaw & Sons, Wolverhampton—Profit, after taxation, for the year ended June 30, 1941, £11,783 (£8,257); dividend of 7½% (5%), £6,149; to general reserve, £6,000; forward, £11,592 (£11,958).

Millom & Askam Hematite Iron—Profit for 1941, after providing for taxation, £35,286 (£69,084); preference dividend, £27,362; dividend of 2½% (10%) on the ordinary shares; forward, £39,829 (£39,216).

Superheater Company—Net profit for 1941, £133,116 (£106,821), less £82,000 (£58,000) tax reserve; interim ordinary dividend of 12½% (same), £8,203 (£9,433); final dividend of 25% (20%), £16,406 (£13,125).

Anti-Attrition Metal—Profit for year to July 31, 1941, £15,382 (£24,695), after £15,000 (£10,275) for taxation reserve; dividend of 5% (12½%); to general reserve, £10,000 (£2,500); forward, £1,929 (£5,797).

Churchill Machine Tool—Net profit for 1941, after depreciation, tax, E.P.T., war damage contribution and fees, £57,686; ordinary dividend of 30% (same); to war contingencies reserve, £20,000; forward, £45,469 (£50,658).

W. Canning—Profit for 1941, after charging depreciation, etc., and providing for taxation, £56,838 (£55,172); to reserve, £15,000; final dividend of 5%, making 10% (same), £15,000; bonus of 2s. per share, £15,000; forward, £45,490 (£38,653).

Heenan, Beddow & Sturmey—Trading loss for the year ended November 30, 1941, £4,889; depreciation, etc., £3,485; brought in, £1,213; debit balance forward, £9,588. Directors state that the terms of a substantial Government contract are in course of negotiation.

British Oxygen—Net profit for 1941, £308,187 (£355,469); dividend on the 6½% preference shares, £17,062 (£19,364); 5% second preference dividend, £26,250 (£29,792); final dividend on the ordinary shares of 7% (8%), making 14% (15%); forward, £67,478 (£54,975).

William Beardmore—Trading profit for 1941, after depreciation and provision for taxation, £201,507 (£360,499); other income, £10,164 (£14,595); interest charges, £26,376; net profit, £182,895 (£328,679); dividend on the ordinary capital of 10% (same); preference dividend, £26,125; to war contingencies reserve, £100,000 (£200,000); forward, £224,415 (£215,145).

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

C. P. Engineering Company, 1, Elizabeth Street, Leicester—£6,000. H. H. Hand.

Seluart Engineering Company, 123, Pritchett Street, Newtown Row, Birmingham—£5,000. H. Hogg.

Monmore Metals, 234, Bilston Road, Wolverhampton—Metal refiners and merchants, etc. £1,000.

Halsteads Engineers (Leyland)—£3,500. A. Dallas, 132, Cop Lane, Penwortham, near Preston, Lancs.

Grantwest Engineers, 86-88, Queen Victoria Street, London, E.C.4—£5,000. J. H. Cooke and J. D. Ferguson.

Longford Engineering Company, 14, Longford Road, Bognor Regis, Sussex—£3,000. C. R. Purley and A. Bedford.

Selyac Precision Engineering Company—£2,000. E. R. C. Cooper and C. F. Ayles, 37, Marks Road, Romford.

Eden Machine Tool Company—£10,000. F. E. Rowland and K. L. Watson, West Heath, Leicester Road, Hale, Ches.

Royton Sheet Metal Works—£1,000. H. Lowe, 60, Church Street, Royton, Lancs; C. C. Ramsden, and F. and E. Simpson.

Robinson Hall—Edge tool manufacturers, etc. £4,000. T. H. R. Hall, 23, Bingham Park Road, Sheffield, 11, subscriber.

A. E. Burgess & Sons, Public Wharf, Belgrave Gate, Leicester—Scrap iron and metal merchants. £6,000. C., E. V. and J. A. Burgess.

Wolverhampton Diamond Die & Tool Company, 42, Brook Street, London, W.1—£5,000. R. and E. Fink and H. and R. Morgenstern.

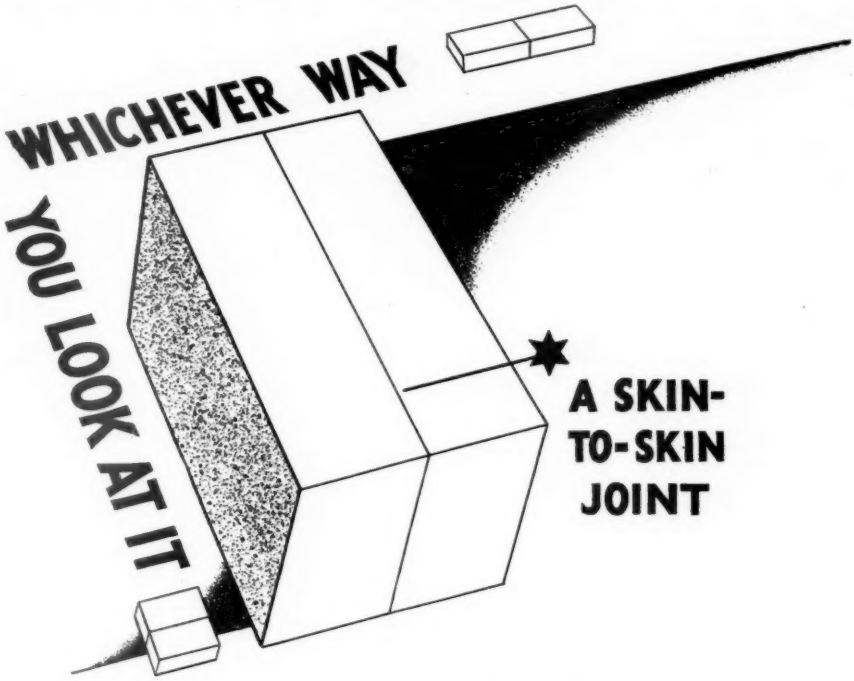
S. C. R. Engineering Company, 75, Parade, Sutton Coldfield—£1,000. M. W. and W. M. Lowe, B. F. Litherland, F. W. B. Watkins, and D. F. Wise.

OBITUARY

MR. ARTHUR TURNER, district engineer of the British Thomson-Houston Company, Limited, died at Stirling on April 20, aged 69.

MR. THOMSON MILLAR, of James Murchie & Company, engineers' furnishers, Glasgow, died recently. He had been associated with the firm for 48 years, and for the past 20 years had been the sole partner.

MR. ANDREW CRAWFORD, who has died in his 94th year at his home, Manor Park, Ruddington, Notts. was for many years a leader in the iron and steel industries of the Midlands, and in conjunction with the Lloyd family built in 1908 at Corby, Northants. the blast furnaces which became the foundation of one of the most noteworthy steel enterprises of the country. For many years Mr. Crawford was chairman and managing director of the Bestwood Coal & Iron Company, Limited, and a director of several other similar enterprises.



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Raw Material Markets

IRON AND STEEL

The light-foundry trade is able to obtain all it requires in the way of raw materials. High-phosphorus iron is promptly forthcoming, but the demand from this section of industry is not at all impressive, owing to the poorly filled order-books at most producing plants. Business in light castings has steadily declined since the beginning of the war, as these products are not needed on any scale for war contracts. Government depots are mostly interested in heavy castings, demand for which has expanded at a fast rate. Makers of these in normal times rely almost solely on supplies of low-phosphorus iron and hematite, but as these grades are manufactured from imported ores, shipments of which have been reduced to a very low level, supplies have to be conserved for users who are unable to find a suitable alternative. High-phosphorus and refined irons are being incorporated in furnace mixtures in ever-increasing quantities and are proving of inestimable value in prevailing conditions.

Supplies of foundry coke are ample, and users are able to buy ahead of their immediate requirements. As a result, many consumers are now taking up large deliveries and are accumulating reserve stocks which will stand them in good stead in the coming winter. Operations in the steel trade are maintained and outputs are at a gratifying level. Production of special and alloy qualities is still the chief factor, as these grades are used very extensively in the manufacture of munitions, armaments, etc. Consumption of these descriptions of steel is expanding and outputs are being improved where possible. Structural steel is in steady demand, with particular emphasis on shipbuilding types. Business at the plate mills is very brisk and plenty of new orders are coming to hand to replace completed work. The sheet mills now have need of additional business, as they can no longer produce galvanised qualities, except for Government needs.

Deliveries of scrap iron and steel appear to be a little easier, and some consuming works have been able to accumulate useful reserve stocks. This mainly applies to the lighter qualities, however, and demand for heavier types is maintained at peak levels. Steelworks, especially, would welcome larger deliveries, but supplies of scrap to which they are accustomed are difficult to acquire, and applications for licences for these grades are now more carefully considered. Ironfoundries generally seem to be getting adequate tonnages of scrap and business in heavy cast-iron scrap, etc., is steady.

CONTRACT OPEN

Birkenhead, May 13—Wrought-iron tubes and fittings; cast-iron pipes and specials; brasswork, gas and meter fittings; tools, bolts and nuts, iron and steel; tinware, etc., during the year from July 1, for the Town Council. The Gas Engineer, Gas Offices, Hind Street, Birkenhead.

NON-FERROUS METALS

If 1942 proves to be the vital period of the war which so many prophets have suggested, consumption of non-ferrous metals will reach hitherto unattained levels. Copper, which is used extensively for the manufacture of ammunition, is already being consumed at a brisk rate for this purpose, and the tendency is for needs of the various supply departments to increase still further. Imports of copper are believed to be sufficient to satisfy all current needs of the Government, but distribution of the metal among non-war users has been curtailed and now consumers in this category can secure supplies only in very special circumstances.

Further cuts in the use of tin are regularly being announced, but before consumption is down to the desired level it is likely that still more economies will be brought into operation, as it is imperative that all available supplies should be conserved for vital war purposes. Output is being expanded where possible. In Nigeria and the Belgian Congo production will, it is hoped, be stepped up appreciably, while the British Government are interested in the efforts now being made to put the Cornish tin-mining industry on a more practicable basis, even to the extent of offering financial assistance. Progress has been made with the erection of the American Government's smelter at Texas City, and it is probable that operations will commence there within a few weeks, although the output for a time may not be more than at the rate of some 20,000 tons per annum. Ultimately it is expected that the output will be around 50,000 tons a year.

Brass is being substituted in some instances for tin, so that consumption of spelter for non-essential purposes may be expected to be still further reduced. So far, all the zinc needed for important usage has been forthcoming, and there is no reason to anticipate any shortage in the war factories, but the Control are allocating supplies with keen discrimination. Substantial quantities of lead are being taken up by Government departments, and this metal now ranks in importance on a level with other non-ferrous metals. Makers of cables, batteries, bullet strip, paint, solder, etc., are busy on orders for the Government, and the consumption of lead is considerable.

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. *each.*

544,165 SHORTER PROCESS COMPANY, LIMITED (Linde Air Products Company). Apparatus for the heat-treatment of elongated metal bodies having longitudinally spaced surface portions to be heat-treated.

544,197 CORNING GLASS WORKS. Manufacture of refractory materials.

544,237 METCALFE, H. Means for supplying heated air to furnace and the like fires.

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When applied to metallurgical furnaces, the close control of temperature ensures the heating of the furnace in the shortest possible time. The steady furnace temperature leads to a greater output with more uniform soaking of the billet or ingot.

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